## APPENDICES

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Appendix 1. Results of Soil Geochemical Analysis
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Abbreviation
    SP-NO : Sample Number
                                ex. 6 - 20
                            Line No. Sampling point No.
    COLOR : Soil Color
    P-YB : pale yellowish brown
    D-YB : dark yellowish brown
    DU-YB: dusky yellowish brown
    M-YB : moderate yellowish brown
        L-B : light brown
        M-B : moderate brown
        D-B : dark brown
    M-RB : moderate reddish brown
    D-RB : dark reddish brown
    D-XO : dark yellowish orange
            GO : grayish orange
    VP-0 : very pale orange
    M-op : moderate orange pink
        P-B : pale brown
        GB : grayish brown
        DU-B : dusky brown
        ROCK
        ML : mafic
        FL: felsic lava
        BIF : banded iron formation
        GR : granitic rock
        MI : mafic intrusive
        FI : felsic intrusive
        UM : ultramafic rock
        SCH : sericite quartz schist
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METAL
AU : gold
AG : silver
AS : arsenic
PT: platinum
CU : cupper
NI : nickle
CO : cobalt
CR : chromiun

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50 L : Less than 50 ppb
0.5M : more than 0.5%
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Appendix 2. Results of Microscopic observation of Thin Sections

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Abbreviation
Primary Minerals
    Cpx : clinopyroxene
    Ho : hornblende
    Bi : biotite
    Pl : plagioclase
    Kf : potash feldspar
    Q : quartz
    Fe : iron oxide
    Acs : accessary mineral
        sphene, apatite;zircon
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Secondary Minerals
Ho : hornblende
Cal: calcite
Ch : chlorite
Pl : plagioclase
Ep : epidote
Ser: sericite
Bi : biotite
Mu : muscovite
Cor: cordierite
Appendix 3. Results of Microscopic observation of Polished sections

| No. | Sample No. | Area/Mine | Ore Minerals |  |  |  |  |  |  |  |  | Gangue M. |  | Remarkable Ore Texture |
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|  |  |  | Au | Py | As | Cp | Gn | Sp | Tet | Bi | Bn | Qtz | Cal |  |
| 1 | GP-1 | GidP Mine |  | $\bigcirc$ |  |  |  | - |  |  |  | O | 0 | diss.py |
| 2 | GP- 2 | do. |  | 0 | - |  |  | - |  |  |  | © |  | Veinlets Py with Sp As at Py contact |
| 3 | GP-3 | do. | - | 0 |  | - | - |  | - |  |  | © | $\bigcirc$ | du micrograins in Py, Cal |
| 4 | GP-6 | do. | - | $\bullet$ |  | 0 | - |  |  |  |  |  |  | electrum inclusion |
| 5 | GP- 7 | do. | - | (0) |  | - | 0 |  | 0 |  |  | © | © | Cn Bo Tet Au inciusions of Py |
| 8 | GP- 8 | do. |  | © |  |  | . | - |  |  |  | 0 | $\bigcirc$ | banded sulphides |
| 7 | GP-8-2 | do. |  | $\bigcirc$ | 0 |  |  | - |  |  |  | 0 | $\bigcirc$ | diss.Py Sp,veinlet of As |
| 8 | GP-9 | do. |  | © |  | 0 | - |  | 0 |  |  |  |  |  |
| 9 | GP-10 | do. |  | © |  | $\bigcirc$ | - | - | 0 |  |  | 0 | 0 | interstitial Tet |
| 10 | GP-11 | do. |  | - |  | - | - |  |  |  |  | © | - | granular Py |
| 11 | GP-13 | do. |  | © |  |  |  | - |  |  |  | 0 | 0 |  |
| 12 | GP-14 | do. |  | - |  | - |  |  |  | 0 | 0 | © |  | granular to fibrous B1. parallel lamella twin of Bn |
| 13 | GP-15 | do. |  | - |  |  |  | - |  |  |  |  |  |  |
| 14 | GP-18 | do. |  | - | - | - | © |  |  |  | 0 |  |  | granular aggregate of Bn |
| 15 | C17-1. | $\mathrm{C}_{2}$ |  | - |  |  |  |  |  |  |  | © |  |  |
| 16 | 030-12 | D2 |  |  |  |  |  |  |  |  |  | © |  | no sulphide mineral |
| 17 | E1-23 | E1 |  | - |  | - |  |  |  |  |  |  |  | diss. Py Cp |
| 18 | E22-28 | $E_{1}$ |  | - |  | - |  |  |  |  |  |  |  |  |
| 19 | UMNIAT12-1 | c | - | - |  |  |  | - |  |  |  | - |  | Py altered to Fe hydroxide at the margin |
| 20 | UMNIAT12-2 | C |  | - |  |  | - | 0 |  |  |  | 0 | - |  |

> diss.: disseminated with $\quad$ Legend 0 : abundant 0 : medium : Present

Au:Electrum Abreviation

> Tet:Tetrahedrite BI:Boulangerite Bn:Burnonite Gangue M.:Gangue Minerals Qtz:Quartz Cal:Calcite

Au:Electrum
Py:Pyrite
As:Arsenopyrite
Cp:chalcopyrite

Sp:Sphalerite

Appendix 4. Results of X-ray Diffractometric Analysis Abbreviation

| Bs | basalt |
| :--- | :--- |
| Sc-Qz-Sch | $:$ sericite quartz schist |
| Qz pyr | : quartz porphyry |
| Spt | : serpentinite |
| Hbd | : hornblendite |
| Fstf | : felsic tuff |
| BIF | $:$ banded iron formation |
| Qz dr | $:$ quartz diorite |


|  | Alteration Mineral le No. | N |  | $\frac{3}{4}$ |  | $\begin{gathered} 6 \\ \frac{8}{2} \\ \frac{2}{5} \\ 4 \\ \vdots \end{gathered}$ | $\begin{aligned} & \frac{0}{8} \\ & \frac{8}{8} \\ & \frac{0}{8} \\ & \hline \end{aligned}$ | $\frac{\$}{3}$ | $\$$ $\vdots$ $\vdots$ $\omega$ $\omega$ | $$ |  |  |  | $\frac{8}{i}$ | $\frac{9}{8}$ |  |  | Note |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 1 | A 3－7 | © | － | － |  |  |  |  | － |  |  |  |  |  | ＂ |  |  | Bs |
| 2 | A 6．3 | © | － |  |  |  |  |  | － | － |  |  |  |  |  |  |  | $\mathrm{Sc}-\mathrm{Qz}-\mathrm{Sch}$ |
| 3 | A 6.6 | （0） | － |  |  | ． |  |  | － |  |  |  |  |  |  |  |  | ＂ |
| 4 | A 9.5 | © | © | － |  | $\bigcirc$ |  |  | － |  |  |  |  | － |  |  |  | Qz pyr |
| 5 | D 2－10 | O |  | － |  |  |  |  | － | O |  |  |  |  |  |  |  |  |
| 6 | D $3-10$ | © |  | － |  |  |  | － |  | O |  |  |  | － |  |  |  |  |
| 7 | D 19－24 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | © | Spt |
| 8 | D 26－17 |  |  |  |  |  | © |  |  | 0 |  |  |  |  |  |  |  | Had |
| 9 | E 7－7 | （0） |  |  |  |  |  |  |  |  |  | － | － |  |  |  |  | Fs tf |
| 10 | E 16－2 | （0） |  | － |  |  |  |  | － |  |  |  |  | － |  |  |  |  |
| 11 | E．19－23 | （0） |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | BIF |
| 12 | E 21－9 | © |  |  |  |  |  |  |  |  |  |  | （0） |  |  |  |  |  |
| 13. | G．P． 4 | © |  |  |  |  |  |  | － | － |  |  |  |  |  | （0） |  |  |
| 14 | G．P． 16 | － |  |  |  |  |  |  |  |  |  |  |  |  | － | O |  |  |
| 15 | G．P． 19 | © |  |  |  |  |  |  | － |  |  |  |  |  | 0 | © |  |  |
| 16 | A3TR2－2 | （0） |  | － |  |  |  |  | － |  |  |  |  |  |  |  |  | Sc－0z－Sch |
| 17 | A3TR2－3 | （0） |  | － |  |  |  |  | － |  |  |  |  | － |  |  |  | ＂ |
| 18 | A3TR3－1 | © | － | － |  |  |  |  | － |  | － |  |  |  |  |  |  | Q 2 pyr |
| 19 | A3TR3－2 | － |  |  |  |  | － |  |  |  | $\bigcirc$ |  |  |  |  |  |  |  |
| 20 | A3TR4－2 | © | － | － |  |  |  |  |  |  |  |  |  |  |  |  |  | 02 dr |
| 21 | A3TR4－4 | － |  | － |  |  | － |  |  |  | － |  |  |  |  |  |  | Bs |
| © ：abundant． <br> O：medium <br> －：present |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## Appendix 5. Au Ag Assay of Ore and Rock

| No. | Sample Name | Area | Sample and Geology | Assay value |  | As/An ratio |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  | An ppob | Ag ppm |  |
| 1 | A 6.4 | A 3 | Black guartz pebbe | 12 | 0.4 | 33 |
| 2 | A 6-8 | A 3 | White quartz pebble | 23 | 0.4 | 17 |
| 3 | C $3 \cdot 21$ | C 2 | Quartz in basalt | N. D. | 5.8 | - - |
| 4 | C 15.17 | C 2 | 110. | 22 | 4.7 | 214 |
| 5 | D 18-13 | D 1 | White tuartz vein | 16 | 0.7 | 44 |
| 6 | D 30-11 | D 2 | do. | 30 | 0.8 | 27 |
| 7 | E 16-22 | E 1 | Banded Iron Formation | $\because 568$ | 1.3 | 2.3 |
| 8 | A3PR1-1 | A3 Trench No. 1 | do. | 3 | 1.8 | 600 |
| 9 | A3TR1-2 | " | do. | N. D. | 0.3 | - |
| 10 | A3TR1-3 | " | do. | 481 | 1.9 | 4 |
| 11 | A3TR2-1 | A3 Trench No. 2 | do. | N. D. | 1,6 | - |
| 12 | A3TR2-2 | " | Sericite quartz rock | 1 | 1.2 | 1,200 |
| 13 | A3TR2-3 | " | do. | N . D. | 1.0 | - |
| 14 | A3TR2-4 | / | Quartz : .. | 12 | 2.8 | 233 |
| 15 | A3TR2-5 | / | Banded Iron Formation | 7 | 2.2 | 314 |
| 16 | A3TR3-2 | A3 Trench No. 3 | Clay at quartz porphyry contact | $\because 13$ | 2.0 | 154 |
| 17 | A3TR4-1 | A3 Trench No. 4 | Quartz vein within quartz porphyty | 165 | 1.2 | 7 |
| 18 | A3TR4-2 | / | do. | 1,737 | 1.7 | 1 |
| 19 | A3TR4-3 | " | Quarty vein at quartz porhyry-basalt | 35 | 0.7 | 20 |
| 20 | A3TR4-4 | " | Alteration zone of basalt | 3 | 2.3 | 767 |
| 21 | UMNIATI-I | Southeast and of area C: | Quartz vein within basalt | $\begin{gathered} 35,930 \\ (35.93 \mathrm{ppan}) \end{gathered}$ | 13.3 | 0.37 |

Analyst : Iijina centre of Analysis co..Ltd N. D. : not detected

Appendix 6. Photomicrographs of Thin Sections




Crossed nicols
0.5 mm
0.5 mm


Sample No. : D30-25
Open nicol
0.5 mm

Rock name : Serpentinite
Note : Serpentinized (antigorite) ultrabasic rock with porphyritic replacement of calcite


Open nicol
Sample No. : D27-13
0.5 mm

Locality
: $D_{2}$ area
Rock name Note

Banded Iron Formation
: Stratification of quartz rich and hematite rich layers


Crossed nicols
0.5 mm

Sample No. : E11-15
. Locality : $\mathrm{E}_{1}$ area
Rock name : Dacite
Note : Fine isogranular acid rock intensely carbonated



Crossed nicols
Sample No. : A4-5 bis
Locality
: $\mathrm{A}_{3}$ area
Rock name : Hornblende-biotite quartzdiorite


Crossed nicois 0.2 mm

Sample No. : A6-6 Locality
Rock name : Muscovite-biotite hornfels Pelitic rock origin


Opeñ nicol
0.2 mm


Crossed nicols
Sample No. : C1-20
Locality : $\mathrm{C}_{2}$ area
Rock name : Porphyritic andesite
relict phenocrysts of plagioclase replaced by hornblende

Appendix 7. Photomicrographs of Polished Sections


Sample No. : G.P.-3
0.05 mm

Locality : L10 Globe and Phoenix mine
Note : Dissemination of chalcopyrite and galena in quartz


Locality : L10 Globe and Phoenix mine
Note : Interstitial intergrowth of tetrahedrite and bournonite $\left(\mathrm{PbCuSbS}_{3}\right)$


Sample No. : G.P.-9
0.2 mm

Locality : L10 Globe and Phoenix mine Note : Microfracture filling pyrite, chalcopyrite and tetrahedrite


Sample No. : G.P.-6
Locality : L10 Globe and Phoenix mine
Note : Electrum and sphalerite inclusions of euhedral pyrite


Locality : L10 Globe and Phoenix mine
Note : Electrum and tetrahedrite occurring in a microfracture within pyrite


Open nicol Sample No. : G.P.- $10 \quad \stackrel{0.1 \mathrm{~mm}}{L^{-1}}$ Locality : Ll0 Globe and Phoenix mine Note : Disseminated sulphides in quartz vein



Open nicol 0.2 mm

Sample No. : G.P.-14


Crossed nicols 0.2 mm
$\qquad$
: L11 Globe and Phoenix mine
Note $\quad:$ Boulangerite showing distinct anisotropism and granular fibrous aggregates


Sample No. : Umniati 2-1 0.1 mm
Locality : Umniati mine (old working)
Note : Electrum grains in quartz associated with Fe -hydroxide pseudomorph after pyrite



LEGEND

| Intusive Rocks | or 11 | Suarlz v |
| :---: | :---: | :---: |
|  |  | Ulliromotic rock |
|  | 6b mex | Gobbro ~ Dolerite |
|  | ap ${ }^{\text {a }}$ | Quortz Porphyry |
|  |  | Quortz Porphyry |
| Middle ~ Upper Burowayon Group |  | Banded iron form |
|  | oc ${ }_{\text {cos }}$ | Docite $\sim$ Rhyolite |
|  | Sch 应淘 | Seficile quartz schist |
|  | Ad $0 \times V$ | Andesite |
|  |  | Basalf |


| a | Schistosily |
| :---: | :---: |
| - | Trench |
|  | Dip, Strike |






| Geoiogic buumaty |  | symbol | Rock type |
| :---: | :---: | :---: | :---: |
| Anomaly cone over $M+\sigma$ | , | mL | maftic lovo |
| Anomoty verer $M+\sigma$ | 2 | FL | felsic lov |
| (12) Anomoly zone over $M+2 \sigma$ | 3 | ${ }_{\text {c }}$ | Conglomeorote $\sim$ Sondsione |
| O Anomaly oree $\mathrm{M}+2 \sigma$ | 4 | Pr | Prylite |
| - | 5 | ${ }^{\text {日 }}$ | Bonded ion tormation |
| A-PEE-1 Sorrey line number | 6 | $\mathrm{g}^{\text {R }}$ | Gronitic G Geissose rock |
| ${ }^{\text {A3R toll }}$ Treent of Phase II | 7 | m 1 | Mofic intrusive |
|  | ${ }^{\text {s }}$ | ${ }_{\text {fi }}$ | Felsic intrusive |
| ${ }^{\prime}$ Oid trench | 9 | $u m$ | Ulltromatic rock |
|  | 10 | - |  |
| T Toulling disposol | 11 | ${ }^{\text {s }}$ | Ouotr - seicitle sch |




| Geologic bundary |  | Symbot | Rock type |
| :---: | :---: | :---: | :---: |
| Anomaly zane over $M+\sigma$ | ' | mL | Matic lova |
| Anomoty verer $M+\sigma$ | 2 | fL | Fetsic lovo |
| (32) Anomaly zone over $\mathrm{M}+2 \sigma$ | 3 | $\mathrm{c}_{\text {c }}$ | Conglomerate $\sim$ Sonostone |
| - ${ }^{\text {a }}$ | 4 | Pr | Phylilie |
| Anomaly over $M+2 \sigma$ | 5 | ${ }^{1}$ | Booned firon tormation |
| A-I E-1 Surerer line oumber | 6 | $\mathrm{G}^{\text {R }}$ | Gronilic $\sim$ Greissose rock |
| astr mat | 7 | mi | motic intrusue |
|  | ${ }^{8}$ | FI | Felsic intusive |
| oid 1 | 9 | um | Ullramztic |
|  | ${ }^{10}$ | - |  |
| Toring disposal | ' | SH | Ouortr - sericite schist |



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MINERAL EXPLORATION KADOMA AREA ZIMBABWE

## Location Map of soil Samples Area A3



Japan international cooperation agency metal mining agency of japan

LEGEND

A 18 Sampling line
1~17 Sampling point
$C 2-\mathrm{C} 2^{\prime}$

D1 - D1'
w


$\mathrm{D} 2-\mathrm{D} 2^{\prime}$



LEGEND

| Imfrusive Rocks |  | Quoriz vein Ultromafic rock Gobbro~Dolerite Quortz Porphyry Granite Porphyry |
| :---: | :---: | :---: |
| Middle ~ Upper Burawayan Group |  | Banded iron formation <br> Docite ~Rhyolite <br> Sericite quartz schist <br> Andesite <br> Bosalt |
|  |  | Schistosity <br> Trench <br> Dip, Strike <br> Line of Cross Section |

